Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

The Ohio Maternal Safety Quality Improvement Project: initial results of a statewide perinatal hypertension quality improvement initiative implemented during the COVID-19 pandemic

Patrick Schneider, MD; Allison Lorenz, MPA; Michelle C. Menegay, PhD; Stephen Afflitto, MHA; Emily Lamb, MA; Nancy Cossler, MD; Kamilah Dixon, MD; Kelly S. Gibson, MD; Carole Lannon, MD; Sandy Fuller, MEd; Susan Ford, MSN; Reena Oza-Frank, PhD; Ryan Everett, MPH; Justin R. Lappen, MD

BACKGROUND: Hypertensive disorders of pregnancy are a leading cause of severe maternal morbidity and mortality, and studies have shown that more than 60% of cases are preventable. As part of a statewide quality Maternal Safety Quality Improvement Project, we adapted the Alliance for Innovation on Maternal Health Severe Hypertension in Pregnancy bundle in a consortium of maternity hospitals in Ohio to improve care processes and outcomes for patients with a severe hypertensive event during pregnancy or the postpartum period.

OBJECTIVE: This study aimed to report the first year of data from this Maternal Safety Quality Improvement Project, including an assessment of the process measures by hospital level of maternal care designation, and provide perspective on the unique challenges of implementing a large-scale Maternal Safety Quality Improvement Project during a global pandemic.

STUDY DESIGN: This Maternal Safety Quality Improvement Project engaged Ohio level 1 to 4 maternity hospitals and provided multimodal quality improvement support. Participating hospitals submitted monthly patient-level data, which included all cases of new-onset sustained severe hypertension. The primary process measure was the proportion of birthing people in Ohio with sustained severe hypertension who received treatment with appropriate acute antihypertensive therapy within 60 minutes. The secondary process measures included receipt of a follow-up appointment after hospital discharge within 72 hours (if discharged on medication) or 10 days (if discharged without medication), a blood pressure cuff on hospital discharge, and education about urgent maternal warning signs. Data for primary and secondary process measures were plotted on a biweekly basis, and statistical process control methods were used to identify special cause variation over time. Data were stratified by various demographic variables, including race or ethnicity, insurance status, and maternal level of care. To assess the effect of the COVID-19 pandemic on this Maternal Safety Quality Improvement Project, process measure data were compared with COVID-19 case volume in Ohio across the study epoch.

RESULTS: A total of 29 hospitals participated in the project from July 2020 to September 2021. Data were collected on 4948 hypertensive events representing 4678 unique patients. In aggregate, the primary process measure (timely and appropriate treatment) demonstrated a 19.3% increase (from a baseline of 56.5% to 67.4%; $P<.001$). The secondary process measures demonstrated significant increases ranging from 26.1% to 166.8% (all $P<.001$). Both non-Hispanic Black and White pregnant or postpartum people demonstrated shifts and sustained improvements in the treatment of severe hypertension, which did not differ by race across the study period. Process measure improvements were achieved and sustained across peaks in the COVID-19 pandemic.

CONCLUSION: This Ohio Maternal Safety Quality Improvement Project demonstrated meaningful changes in project process measures in the identification and treatment of severe hypertension in pregnancy and the postpartum period. Process measures improvements were achieved across all hospital levels of maternal care, and differences were not observed by race or ethnicity. Our findings suggest that a robust and comprehensive quality improvement initiative with appropriate support and resources can achieve meaningful gains in the setting of a global pandemic.

Key words: COVID-19, health disparities, hypertension, preeclampsia or eclampsia, quality improvement

Introduction

Hypertensive disorders of pregnancy (HDPs) remain among the leading causes of severe maternal morbidity (SMM) and mortality in the United States, primarily because of the sequelae of sustained severe hypertension (defined as a blood pressure [BP] ≥160/110 mm Hg persisting for ≥15 minutes).[1–3] Studies of hypertension-related SMM and mortality have demonstrated that >60% of cases are likely preventable, with delays in the recognition, diagnosis, and provision of timely and appropriate acute antihypertensive therapy being the primary contributing factors.[4–6] In addition, there are long-standing disparities in the risk of SMM and mortality related to HDPs, with non-Hispanic Black women having a significantly increased risk of experiencing an adverse outcome.[7] The American College of Obstetricians and Gynecologists (ACOG) recommends that acute antihypertensive therapy for sustained severe hypertension be administered expeditiously, with a goal of treatment within 30 to 60 minutes of diagnosis.[8,9] Despite this recommendation, the rates of timely and appropriate treatment of sustained severe hypertension in

Cite this article as: Schneider P, Lorenz A, Menegay MC, et al. The Ohio Maternal Safety Quality Improvement Project: initial results of a statewide perinatal hypertension quality improvement initiative implemented during the COVID-19 pandemic. Am J Obstet Gynecol MFM 2023;5:100912.

2589-9333/$36.00

http://dx.doi.org/10.1016/j.ajogmf.2023.100912

AJOG MFM at a Glance

Why was this study conducted?

This study aimed to report the first year of data from a statewide quality improvement project on severe hypertension during pregnancy and to provide perspective on the unique challenges of implementing a large-scale quality improvement project during the COVID-19 pandemic.

Key findings

Improvements in all process measures, including the identification and treatment of severe hypertension, were achieved during the study period. Process measures improvements were observed across all hospital levels of maternal care, and differences were not observed by self-reported maternal race or ethnicity.

What does this add to what is known?

This study provides novel data on the effect of a statewide quality improvement project on the identification and treatment of severe hypertension by maternal level of care and demonstrates that large-scale obstetrical quality improvement initiatives can be successfully implemented during a global pandemic.

pregnancy and the postpartum period remain poor, with several studies reporting that fewer than half of patients receive treatment within the recommended 60-minute timeframe.[10–12]

Recent data from the Ohio Maternal Mortality Review Committee reported that of the 185 maternal deaths that occurred during 2008 to 2016, 12% were caused by HDPs (of which 68% occurred after delivery), and 85% were deemed preventable.[13] In addition, health disparities were evident with the mortality rate being 2.5-fold higher in non-Hispanic Black women. In response to these data, a statewide Maternal Safety Quality Improvement Project (MSQIP) was initiated to use the Alliance for Innovation on Maternal Health (AIM) Severe Hypertension in Pregnancy patient safety bundle to reduce SMM and health disparities related to HDPs in Ohio by 2024. This MSQIP occurred entirely within the timeframe of the COVID-19 pandemic. This study reports on the first year of data from our MSQIP, including an assessment of the process measures by hospital level of maternal care designation, and provides perspective on the unique challenges of implementing a large-scale MSQIP during a global pandemic.

Materials and Methods

The Ohio MSQIP, sponsored by the Ohio Department of Health, using funding from the Health Resources and Services Administration, and administered by the Ohio Colleges of Medicine Government Resource Center in partnership with The Ohio University Wexner Medical Center, the Cleveland Clinic Foundation, University Hospitals Cleveland Medical Center, the MetroHealth system, the Ohio Hospital Association, and the Ohio Perinatal Quality Collaborative, was implemented beginning on October 1, 2020. A planning period began in September 2019 led by an interdisciplinary clinical advisory panel composed of maternal-fetal medicine subspecialists, obstetrics and gynecology specialists (P.S., N.C., K.D., K.S.G., and J.R.L.), a combined Internal Medicine and Pediatrics specialist (C.L.), quality improvement (QI) experts (A.L., S.A., S.F., and S.F.), researchers (M.C.M. and E.L.), and state sponsor representatives (R.O.F. and R.E.). The team of QI experts had extensive experience in leading effective statewide QI collaboratives and coaching clinical teams. During the planning period, the project team defined the primary process measures for the MSQIP toward achieving the primary clinical objective of reducing SMM, maternal mortality, and health disparities related to HDPs in Ohio by 2024.

The clinical advisory panel reviewed best practices for the identification, treatment, and management of HDPs and adapted a clinical change package from the AIM Severe Hypertension in Pregnancy patient safety bundle.[14] The clinical change package was structured according to the 4 primary domains outlined in the AIM patient safety bundles: readiness, recognition, response, and reporting and systems learning, with specific clinical guidelines adapted for best practices observed in Ohio. In alignment with efforts by AIM, a fifth "R" domain—respectful care—was established by a dedicated Equity Subcommittee to increase the focus on reducing health disparities and provide additional resources for participating sites, including access to implicit bias or antiracism training programs.

The initial phase of the project engaged Ohio maternity hospitals, which were recruited from July 2020 to September 2020 (Appendix 1). Level 1 to 4 maternity hospitals[15] were engaged in project activities based on overall delivery volume, non-Hispanic Black delivery volume, location (facilities based in Ohio Equity Institute counties), and SMM rate.[16] Once recruited, hospitals established a multidisciplinary project team supporting site-specific QI activities. The total number of team members and distribution of roles and responsibilities were left to the discretion of each site. Participating sites were provided with a technical infrastructure stipend to support the collection and submission of project data. Furthermore, sites completed a data use agreement to allow for patient-level data submission.

Participating sites received multimodal QI support, including monthly action period webinars and individual site coaching. Because of the pandemic, this support and mentoring occurred through a virtual format. Monthly action period calls involved Web-based learning opportunities engaging all participating sites. Calls included a review of aggregate project data (with stratification by maternity care level and race or ethnicity where appropriate), a review of clinical best practices supported by the clinical change

package, and peer-to-peer discussions about QI best practices identified via site-specific Plan-Do-Study-Act (PDSA) cycles. The clinical topics covered and a comprehensive list of resources available to sites are listed in Appendix 2. In addition, each participating site received an individual QI coach responsible for reviewing data, facilitating site-level quality assurance with study processes and data entry, addressing site-level barriers and challenges, and providing feedback through bimonthly 1-on-1 coaching calls.

This MSQIP collaborative used an adapted version of the Institute for Healthcare Improvement Model for Improvement, which includes establishing aims, defining measures, and identifying tests of change via the implementation of PDSA cycles.[17] To support the application of QI, sites submitted data monthly using a standardized data form that was piloted by The Ohio State University Wexner Medical Center (Appendix 3). Hospital staff completed data forms for all cases of new-onset sustained severe hypertension in pregnancy through 6 weeks after delivery. New-onset sustained severe hypertension was defined as the first episode of a BP ≥160/110 mm Hg that persisted at or beyond 15 minutes during any phase of hospitalization or care setting, including the emergency department, obstetrical triage unit, labor and delivery unit, antepartum unit, postpartum unit, or other inpatient units. Participating hospitals entered patient data into REDCap, a secure Web-based data storage platform.[18] Individual sites were responsible for creating a process for the accurate identification of patients who experienced new-onset sustained severe hypertension in alignment with the AIM definition and the completion of study data forms and entry of all study data, which were reviewed at the site level as part of the individual coaching calls. After submission, the data were processed and assessed for outliers with any discrepancies resolved through communication and review with the participating site. The data were used to populate measures in a password-protected dashboard accessible to sites through a site-specific login. Data in the dashboard were available at the individual hospital site, system, and collaborative level and could be analyzed at biweekly, monthly, or quarterly time intervals. All available data were stratified by various factors, including hospital system, hospital level of maternal care, or race or insurance status to allow assessment of disparities.

Here, the primary and secondary process measures are defined in Table 1. Each measure was stratified by race or ethnicity to determine the rate of disparities within site and collaborative activities. The primary and secondary process measures were plotted on a biweekly basis using aggregate data from all participating sites with

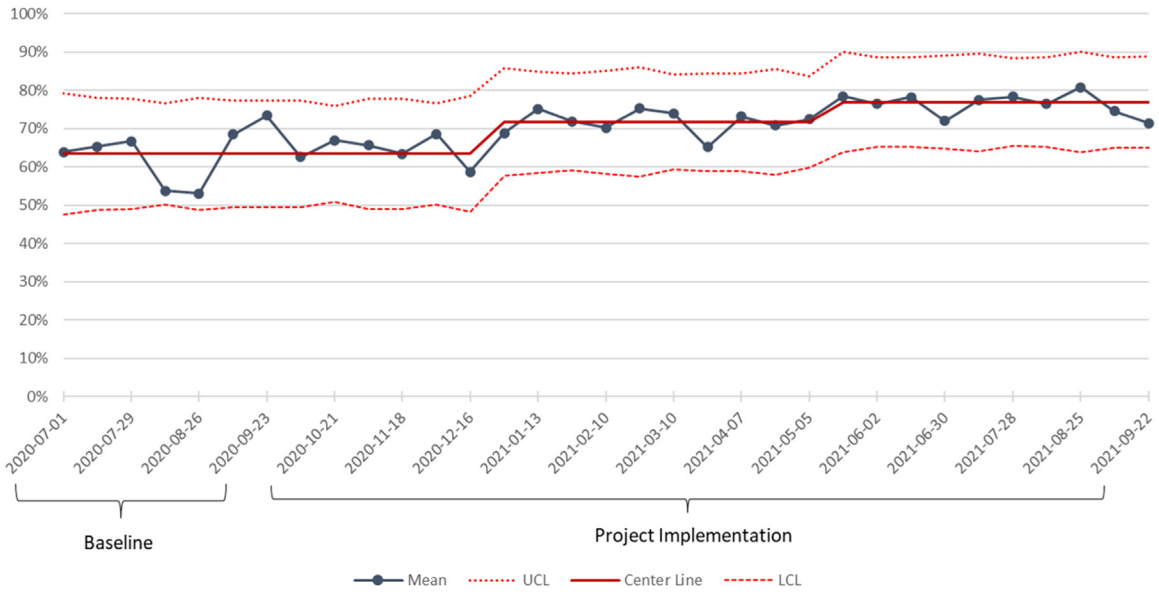
TABLE 1
Ohio AIM Hypertension Quality Improvement Project primary and secondary process measures

Measure definition	Numerator	Denominator
Primary process measure		
Timely treatment	All cases who received appropriate treatment (IV labetalol, IV hydralazine, PO IR nifedipine) within 60 min of the first elevated BP	All pregnant and postpartum people with severe hypertension (SBP of ≥160 mm Hg or DBP of ≥110 mm Hg) that is sustained >15 min and sequential (≥2 occurrences)
Secondary process measures		
Follow-up appointment scheduled (all)	All cases who have a follow-up appointment scheduled within 10 d before discharge	All pregnant and postpartum people with severe hypertension (SBP of ≥160 mm Hg or DBP of ≥110 mm Hg) that is sustained >15 min and sequential (≥2 occurrences) who were not transferred out to another hospital
Follow-up appointment scheduled (discharged on medications)	All cases who were discharged on antihypertensive medications and had a follow-up appointment scheduled within 72 h	All pregnant and postpartum people with severe hypertension (SBP of ≥160 mm Hg or DBP of ≥110 mm Hg) that is sustained >15 min and sequential (≥2 occurrences) who were not transferred out to another hospital and were discharged on medications
Discharge education	All cases that received discharge education materials about preeclampsia	All pregnant and postpartum people with severe hypertension (SBP of ≥160 mm Hg or DBP of ≥110 mm Hg) that is sustained >15 min and sequential (≥2 occurrences) who were not transferred out to another hospital
BP cuff receipt	All cases who were provided with a BP cuff or an order was placed for a cuff	All pregnant and postpartum people with severe hypertension (SBP of ≥160 mm Hg or DBP of ≥110 mm Hg) that is sustained >15 min and sequential (≥2 occurrences) who were not transferred out to a different hospital

AIM, Alliance for Innovation on Maternal Health; *BP*, blood pressure; *DBP*, diastolic blood pressure; *IR*, immediate release; *IV*, intravenous; *PO*, oral; *SBP*, systolic blood pressure.

Schneider. Maternal hypertension safety project: initial results. Am J Obstet Gynecol MFM 2023.

FIGURE 1
Severe hypertension episodes treated within 60 minutes at Level 3 and 4 sites

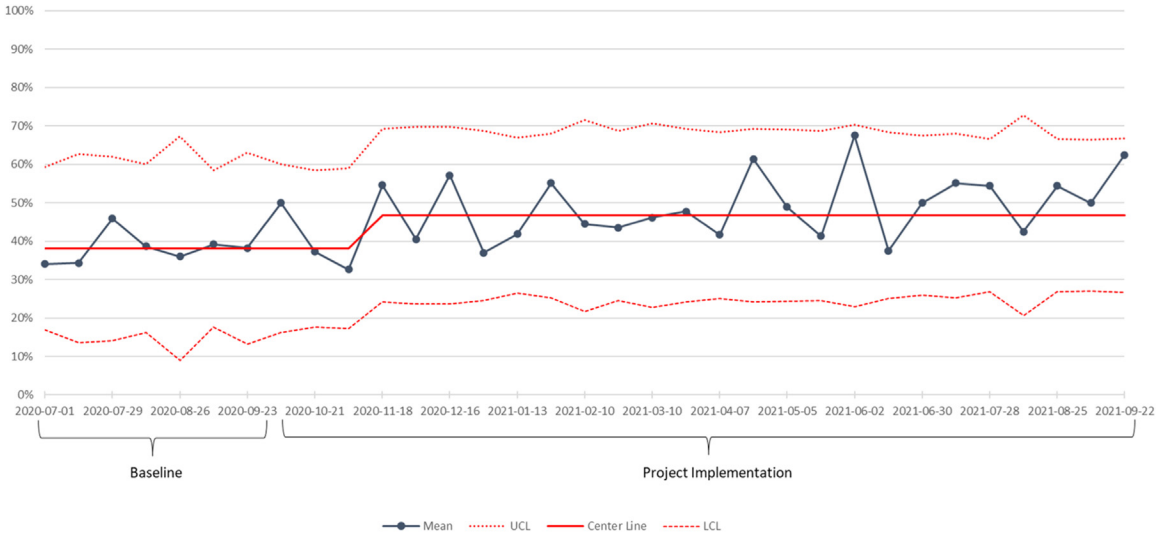


LCL, lower control limit; *UCL*, upper control limit.

Schneider. Maternal hypertension safety project: initial results. Am J Obstet Gynecol MFM 2023.

appropriate control limits.[19,20] A baseline weighted mean (centerline) was calculated for each measure using biweekly periods from a retrospective cohort of data collected from all sites for a 3-month period before project implementation (July 1, 2020, to September 30, 2020). Once the centerline was established, statistical process control methods were used to construct control limits 3 standard errors above and below the centerline (Figures 1 and 2). Special cause variation was identified by observing at least (1) 8 points above or below the centerline or (2) 6 consecutive

FIGURE 2
Severe hypertension episodes treated within 60 minutes at Level 1 and 2 sites



LCL, lower control limit; *UCL*, upper control limit.

Schneider. Maternal hypertension safety project: initial results. Am J Obstet Gynecol MFM 2023.

points increasing or decreasing, at which point a new centerline and control limits were calculated and a shift was built and saved in the dashboard. Special cause variation was calculated at site and collaborative level for each measure. Of note, 2-sample tests of proportions between the baseline and current means for all measures, overall, and by maternity care level were performed. Statistical significance was defined as $P<.05$. Lastly, to assess the effect of the COVID-19 pandemic on this MSQIP, process measure data were compared with COVID-19 case volume in Ohio across the study epoch. All data were analyzed using R (version 4.0.1; R Foundation for Statistical Computing, Vienna, Austria; 2020-06-06).[21] The Ohio Department of Health and The Ohio State University Wexner Medical Center Institutional Review Boards (IRB) determined this initiative to be a quality improvement activity that was exempt from IRB review.

Results

Of note, 30 hospitals were recruited to this MSQIP with 29 sites completing collaborative activities. Among the 29 sites, 863 cases met the clinical criteria for sustained severe hypertension during the baseline period (July 1, 2020, to September 30, 2020), with an additional 4085 cases of sustained severe hypertension during the 12-month implementation period (October 1, 2020, to September 30, 2021). Therefore, the cohort available for analysis in this study includes 4948 cases of sustained severe hypertension representing 4678 unique patients. The demographic and obstetrical characteristics of our study cohort are depicted in Table 2. The cohort was racially and ethnically diverse, with 1333 (28.5%) identifying as non-Hispanic Black, 2897 (61.9%) as non-Hispanic White, 195 (4.2%) as Hispanic, and 253 (5.4%) as another non-Hispanic race. Overall, 45.9% of the patients were enrolled in Medicaid. The number of severe hypertensive events that met the clinical criteria by site ranged from 12 to 553 during the data collection period (level 1 [12−104], level 2 [32−298], and level 3 or 4 [71

TABLE 2
Demographic and obstetrical characteristics among patients with severe maternal hypertension

Characteristic	Wave 1 (n=4678)	
	n	%
Age (y)		
<18	46	1.0
18−34	3403	73.9
35−40	978	21.2
>40	177	3.8
Race or ethnicity		
Black, non-Hispanic	1345	28.8
White, non-Hispanic	2894	61.9
Asian, non-Hispanic	85	1.8
Hispanic	194	4.1
Another race[a]	11	0.2
Multiracial	38	0.8
Missing	111	2.4
Insurance		
Medicaid	2145	45.9
Private or commercial	2415	51.6
Self-pay or other	118	2.5
Pregnancy status		
Pregnant	3690	78.9
Postpartum	988	21.1
Chronic hypertension status		
No	3564	76.2
Yes	1114	23.8
Location[b]		
Obstetrical triage	1208	25.8
Labor and delivery	2940	62.9
Postpartum	595	12.7
Antepartum	295	6.3
Emergency department	193	4.1
Other	87	1.9
Body mass index at event (kg/m^2)		
Underweight (<18.5)	11	0.2
Normal (18.5 to <25.0)	246	5.3
Overweight (25.0 to <30.0)	749	16.1
Obese		
Class 1 (30.0 to <35.0)	963	20.7
Class 2 (35.0 to <40.0)	995	21.4

(continued)

TABLE 2
Demographic and obstetrical characteristics among patients with severe maternal hypertension *(continued)*

Characteristic	Wave 1 (n=4678)	
Class 3 (40.0 to <50.0)	1126	24.2
Class 4 (≥50.0)	394	8.5
	Mean	SD
Gestational age at event (wk)	35.9	4.5

Data are presented as mean (SD) or number (percentage). Percentages are based on 4678 unique patients; there were 4948 events because of some patients having multiple hospitalizations.

SD, standard deviation.

[a] Another race includes American Indian, Alaska Native, Native Hawaiian, Pacific Islander, Arabic, Somali, Uzbek, and others; [b] Multiple locations could be selected; therefore, percentages do not sum to 100%.

Schneider. Maternal hypertension safety project: initial results. Am J Obstet Gynecol MFM 2023.

−553]). Of the sustained severe hypertension events, 3857 events (78.0%) occurred during pregnancy (antenatal or intrapartum) with the remaining 1090 events (22.1%) occurring after delivery.

Aggregate data on the percentage change from baseline for primary and secondary process measures are displayed in Table 3. All primary and secondary process measures demonstrated significant improvement from the baseline during the project period. The primary process measure, the appropriate treatment of sustained severe hypertension within 60 minutes, increased by 19.3% from a baseline of 56.5% to 67.4% ($P<.001$). All secondary process measures demonstrated significant increases from baseline (all $P<.001$) (Table 3).

Given that project implementation occurred during the COVID-19 pandemic, we assessed trends in process measures relative to COVID-19 cases and hospitalizations in Ohio. From July 1, 2020, to September 22, 2021, there were 1,330,446 diagnosed or probable cases of COVID-19, with 64,032 cases (4.8%) resulting in hospitalization. Figure 3 displays the rate of treatment of sustained severe hypertension within 60 minutes and daily COVID-19 cases in Ohio from July 2020 to September 2021. The first shift in the treatment of severe hypertension within 60 minutes occurred during the initial peak of the pandemic in November 2020, shifting the mean centerline from 56.5% to 62.2% (+10.1%). Similarly, a shift in the measure for follow-up visits was observed during the first peak of the pandemic in December 2020 (Figure 4). This improvement was sustained throughout the project, and a second shift for both process measures was observed following the initial peak of the pandemic.

Data for the process measure of treatment of sustained severe hypertension within 60 minutes stratified by race are demonstrated in Figure 5. At baseline, the rate of treatment of severe hypertension within 60 minutes was not significantly different between non-Hispanic Black and White patients ($P=.05$). Both non-Hispanic Black and White pregnant or postpartum people demonstrated shifts and sustained improvements in this process measure. Overall, the rate of timely treatment of severe hypertension was not significantly different between non-Hispanic Black and White pregnant or postpartum people during the study period ($P=.09$).

Discussion

Principal findings

The implementation of the Ohio MSQIP for severe hypertension in pregnancy and the postpartum period among participating Wave 1 sites in Ohio demonstrated meaningful changes in the primary and secondary project process measures. Improvements were noted for the timely delivery of acute antihypertensive therapy within 60 minutes for sustained severe hypertension, follow-up appointment scheduling after hospital discharge, and the provision of BP cuffs for home monitoring. Gains occurred independent of maternal race and ethnicity and at all maternity care levels, with level 1 and 2 centers achieving rapid and substantive gains and largely equalizing the performance of level 3 and 4 centers. Our performance is largely consistent with reports from other similar state-level quality improvement initiatives[11,12,22]; however, our MSQIP provides novel data given the assessment of outcomes by level of maternal care and race and ethnicity and in the performance of a statewide QI project during a global pandemic.

Results

Previous reporting on state-level severe hypertension in pregnancy and postpartum QI has not analyzed performance by maternal level of care designations (level 1−4 centers). The available literature supporting the effect of maternal level of care on pregnancy outcomes is limited.[23] Demonstrating that level 1 and 2 centers can have profound performance improvement, to the point of equalizing level 3 and 4 centers, highlights that improvements can be shared globally by patients and care teams at any point of entry into obstetrical care.

Furthermore, both non-Hispanic Black and White pregnant or postpartum people demonstrated improvements in the treatment of severe hypertension, which did not differ by race across the study period. Disparities in hypertensive care in pregnancy and after delivery have been well characterized, with Black pregnant people having a significantly higher rate of SMM related to HDPs.[7] A concern before the start of this work was that the prevalence of SARS-CoV-2 infection and the disproportionate burden of infection for non-Hispanic Black patients would disrupt efforts toward hypertension care.[24−26] The finding of significant, equitable improvements in the timely treatment of severe HTN for Black participants showed that at-risk groups are

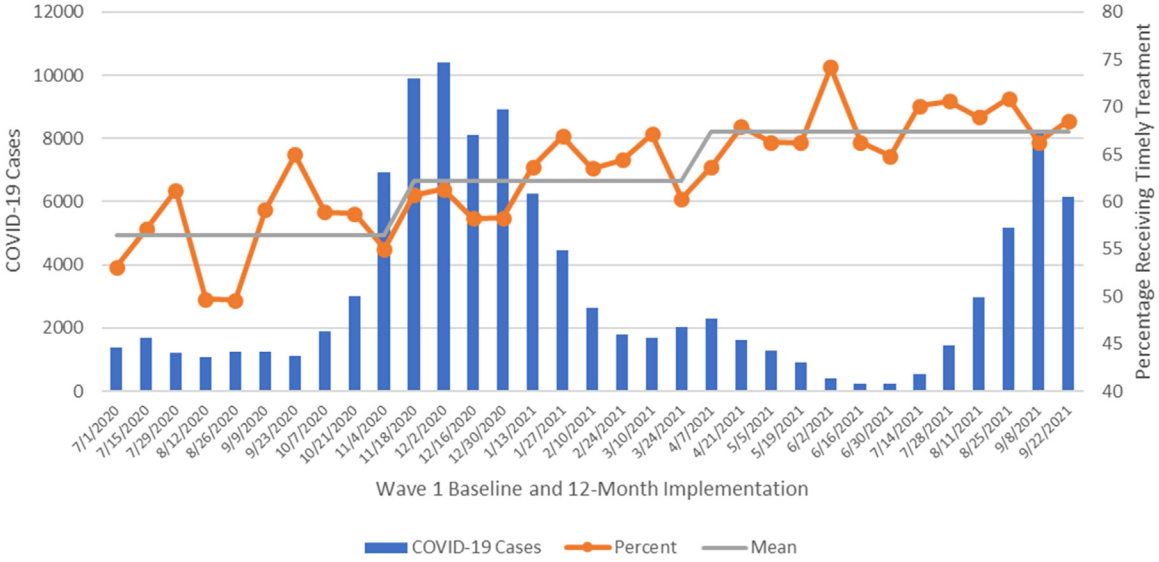
TABLE 3
Change in primary and secondary process measures

Primary and secondary process measures	Baseline mean	Current mean	% Difference	% Increase	*P* value
Treatment within 60 min					
Aggregate	56.5	67.4	10.9	19.3	<.001
Levels 1 and 2	38.1	47.6	9.6	25.1	.02
Levels 3 and 4	63.4	76.2	12.8	20.1	<.001
Education materials					
Aggregate	72.5	92.4	19.9	27.4	<.001
Levels 1 and 2	70.4	88.7	18.3	26.0	<.001
Levels 3 and 4	73.3	93.0	19.8	27.0	<.001
Follow-up scheduled within 10 d					
Aggregate	43.6	55.0	11.4	26.1	<.001
Levels 1 and 2	43.3	56.7	13.3	30.7	.002
Levels 3 and 4	43.7	55.7	11.9	27.3	<.001
Follow-up scheduled within 72 h (on antihypertensive therapy)					
Aggregate	14.5	38.6	24.1	166.8	<.001
Levels 1 and 2	22.5	22.5	0	0	—
Levels 3 and 4	12.6	40.0	27.5	219.0	<.001
BP cuff provided					
Aggregate	38.4	65.4	27.0	70.4	<.001
Levels 1 and 2	10.8	48.0	37.2	343.0	<.001
Levels 3 and 4	47.6	72.8	25.2	52.9	<.001

BP, blood pressure.

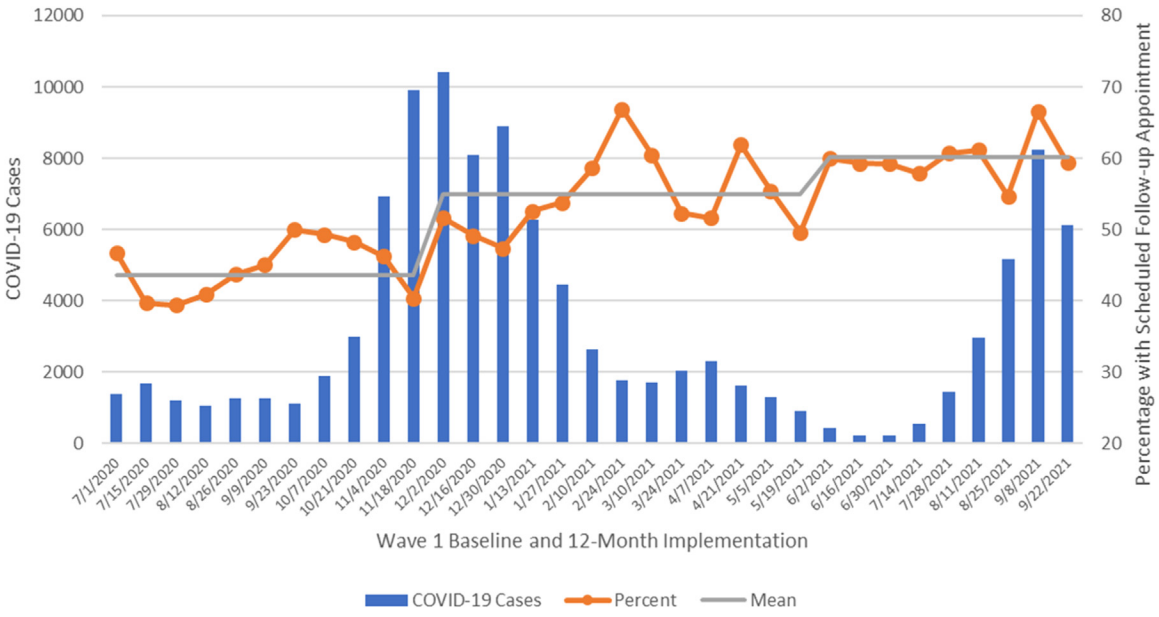
Schneider. Maternal hypertension safety project: initial results. Am J Obstet Gynecol MFM 2023.

FIGURE 3
Severe hypertension episodes treated within 60 minutes and daily COVID-19 cases during baseline and implementation



Schneider. Maternal hypertension safety project: initial results. Am J Obstet Gynecol MFM 2023.

FIGURE 4
Follow-up appointments scheduled and daily COVID-19 cases during baseline and implementation



Schneider. Maternal hypertension safety project: initial results. Am J Obstet Gynecol MFM 2023.

able to share in improvements in care delivery.

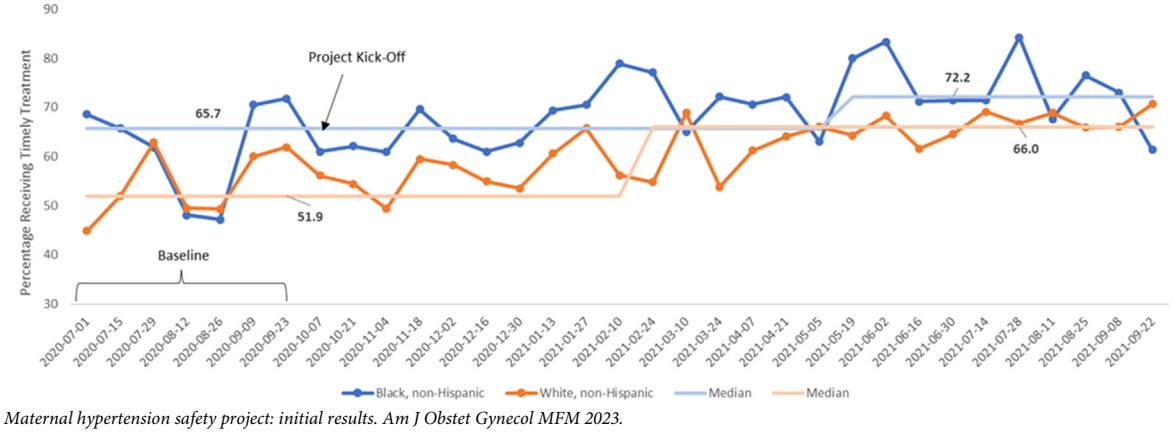
That these gains were able to be achieved during a pandemic with relatively constrained site-level resources and capacity for initiating non-COVID-19 quality improvement projects is commendable. During periods of relative recession of COVID-19, substantive gains were able to be achieved. Moreover, these gains did not recede with increasing rates and subsequent waves of infection demonstrating resiliency in the changes implemented.

Clinical and research implications

Our findings suggest that a robust and comprehensive QI initiative with appropriate support and resources can continue to function and demonstrate resiliency in the setting of a global pandemic. Gains and improvements were able to be maintained and further improved upon, as witnessed during COVID-19 surges and abatements (Figure 3).

The collaborative framework of this project is not unique to Ohio. The development of the project was conducted on the basis of structures and

FIGURE 5
Treatment of sustained severe hypertension within 60 minutes stratified by race



Schneider. Maternal hypertension safety project: initial results. Am J Obstet Gynecol MFM 2023.

efforts successfully achieved in other state-level initiatives[12,22] with attention to the evolving pandemic. The partnership between the project leadership team and all participating sites allowed for real-time adaptation of the project approach and timing of interventions relative to account for the shifting COVID-19 landscape. Such collaboration can serve as a model for other state-level quality initiatives both during and outside a pandemic. Lastly, the ease of implementation of the tools and resources from professional organizations, including AIM and ACOG, demonstrates the effectiveness, generalizability, thoughtfulness, and attention inherent in these foundational programs.[14]

Strengths and limitations

The strengths of our study include the application of robust, rigorous QI approaches and methodologies across the participating study sites during the study period. The limitations of our findings include the inability to provide information on the rates of SMM and maternal mortality because of data issues disentangling cases associated with and without COVID-19. The project leverages state-reported metrics and is still refining the process to obtain SMM data reliably, accurately, and objectively. Although we anticipate that improvements in the timely delivery of antihypertensive therapy within 60 minutes for severe hypertension episodes and coadministration of magnesium sulfate for seizure prophylaxis may reduce the rates of SMM as reported by others,[12] we are not yet able to report on this outcome. We anticipate the ability to present such information and updated process measure data by the conclusion of the planned 3-year study period.

In addition, we recognize that opportunities for improvement in performance metrics remain. Other published hypertension quality improvement initiatives have demonstrated process measure rates for metrics, such as the timely administration of antihypertensive therapy at approximately 80%.[11,12,22] Although the participating sites have not yet achieved those rates, the project presented here represents only 1 year of work, whereas state-level projects have typically not appreciated 80% performance until ≥2 years of active work. The Wave 1 sites in this project continue to participate in this quality improvement initiative, and further improvements and gains are anticipated.

Finally, our data were derived from self-reported submissions. Although we assumed that sites self-reported data accurately and correctly given the guidance and support provided to aid in case identification and submission, we are not able to audit and verify the accuracy or completion of each submission. Furthermore, we were unable to perform site-level retrospective reviews for cases that may have been missed for inclusion, and as such, ascertainment bias cannot be excluded.

Although the demands and challenges of COVID-19 have demonstrated that there may be significant shifts in support and funding that make resources and attention relatively scarce at institutional, state, and governmental levels, our findings demonstrate that important perinatal quality goals may be meaningfully achieved, particularly concerning topics and measures central to the prevention of SMM and maternal mortality, such as severe hypertension in pregnancy and the postpartum period. The progress achieved during our project suggests that quality improvement initiatives can lead to improvements in maternal care, even in the setting of a global pandemic.

Conclusions

Through participation in the Ohio MSQIP, labor and delivery hospitals across Ohio were able to leverage evidence-based guidelines to proactively improve care for and health outcomes of people who experienced a hypertensive event during pregnancy. Participating hospitals were able to implement the program and sustain their successes in the setting of a disruptive pandemic. This project suggests that efforts to address the important issues of SMM and maternal mortality in the United States should continue during the pandemic. There are still meaningful and substantive opportunities to ensure that coordinated efforts addressing obstetrical quality and safety can be sufficiently and meaningfully addressed. ■

ACKNOWLEDGMENTS

The authors would like to acknowledge and thank the Wave 1 hospital teams for their ongoing participation and engagement in this project. Furthermore, we thank the Alliance for Innovation on Maternal Health for providing resources and guidance throughout the project.

References

1. Kilpatrick SJ, Abreo A, Greene N, et al. Severe maternal morbidity in a large cohort of women with acute severe intrapartum hypertension. Am J Obstet Gynecol 2016;215. 91.e1–7.

2. Petersen EE, Davis NL, Goodman D, et al. Vital signs: pregnancy-related deaths, United States, 2011-2015, and strategies for prevention, 13 states, 2013-2017. MMWR Morb Mortal Wkly Rep 2019;68:423–9.

3. GBD 2015 Maternal Mortality Collaborators. Global, regional, and national levels of maternal mortality, 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet 2016;388:1775–812.

4. Main EK, McCain CL, Morton CH, Holtby S, Lawton ES. Pregnancy-related mortality in California: causes, characteristics, and improvement opportunities. Obstet Gynecol 2015;125:938–47.

5. Ozimek JA, Eddins RM, Greene N, et al. Opportunities for improvement in care among women with severe maternal morbidity. Am J Obstet Gynecol 2016;215. 509.e1–6.

6. Judy AE, McCain CL, Lawton ES, Morton CH, Main EK, Druzin ML. Systolic hypertension, preeclampsia-related mortality, and stroke in California. Obstet Gynecol 2019;133:1151–9.

7. Creanga AA, Berg CJ, Syverson C, Seed K, Bruce FC, Callaghan WM. Race, ethnicity, and nativity differentials in pregnancy-related mortality in the United States: 1993-2006. Obstet Gynecol 2012;120:261–8.

8. Gestational hypertension and preeclampsia: ACOG Practice Bulletin, Number 222. Obstet Gynecol 2020;135:e237–60.

9. American College of Obstetricians and Gynecologists' Committee on Practice Bulletins—Obstetrics. ACOG Practice Bulletin No. 203: chronic hypertension in pregnancy. Obstet Gynecol 2019;133:e26–50.

10. Kantorowska A, Heiselman CJ, Halpern TA, et al. Identification of factors associated with delayed treatment of obstetric hypertensive emergencies. Am J Obstet Gynecol 2020;223. 250.e1–11.

11. Deshmukh US, Lundsberg LS, Culhane JF, et al. Factors associated with appropriate treatment of acute-onset severe obstetrical hypertension. Am J Obstet Gynecol 2021;225. 329.e1–10.

12. Shields LE, Wiesner S, Klein C, Pelletreau B, Hedriana HL. Early standardized treatment of critical blood pressure elevations is associated with a reduction in eclampsia and severe maternal morbidity. Am J Obstet Gynecol 2017;216. 415.e1–5.

13. Ohio Department of Health 2020. Special Topics Report on Pregnancy-Related Deaths Due to Pre-eclampsia and Eclampsia in Ohio, 2008-2016. https://odh.ohio.gov/know-our-programs/pregnancy-associated-mortality-review/media/pre-eclampsia-eclampsia. Accessed February 16, 2022.

14. Alliance for Innovation on Maternal Health. Severe hypertension in pregnancy. Available at: https://saferbirth.org/psbs/severe-hypertension-in-pregnancy/. Accessed February 16, 2022.

15. Ohio administrative code. Chapter 3701–7, Maternity Units and Homes. Available at: https://codes.ohio.gov/ohio-administrative-code/chapter-3701-7. Accessed January 15, 2023.

16. Walker D, DePuccio M, Hefner, J, Sieck C, Hogan T, McAlearney A, et al. Increasing Capacity for Evaluation of Community-Based Organizations: Lessons from the Ohio Equity Institute. Ohio J Public Health 2022.

17. Institute for Healthcare Improvement. Plan-Do-Study-Act (PDSA) worksheet. 2023. Available at: http://www.ihi.org/resources/Pages/Tools/PlanDoStudyActWorksheet.aspx. Accessed February 16, 2022.

18. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research Electronic Data Capture (REDCap)–a metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inform 2009;42:377–81.

19. Benneyan JC, Lloyd RC, Plsek PE. Statistical process control as a tool for research and healthcare improvement. Qual Saf Health Care 2003;12:458–64.

20. Provost LP, Murray S. The health care data guide: learning from data for improvement. Chichester, United Kingdom: John Wiley & Sons; 2011.

21. R Core Team. R: a Language and Environment for Statistical Computing. 2020. Available at: https://www.R-project.org/. Accessed April 16, 2022.

22. King PL, Keenan-Devlin L, Gordon C, Goel S, Borders A. Reducing time to treatment for severe maternal hypertension through statewide quality improvement. Am J Obstet Gynecol 2018;218:S4.

23. Levels of maternal care: Obstetric Care Consensus No, 9 Summary. Obstet Gynecol 2019;134:428–34.

24. Zambrano LD, Ellington S, Strid P, et al. Update: characteristics of symptomatic women of reproductive age with laboratory-confirmed SARS-CoV-2 infection by pregnancy status - United States, January 22-October 3, 2020. MMWR Morb Mortal Wkly Rep 2020;69:1641–7.

25. Emeruwa UN, Gyamfi-Bannerman C, Miller RS. Health care disparities in the COVID-19 pandemic in the United States: a focus on obstetrics. Clin Obstet Gynecol 2022;65:123–33.

26. Gur RE, White LK, Waller R, et al. The disproportionate burden of the COVID-19 pandemic among pregnant Black women. Psychiatry Res 2020;293:113475.

Author and article information

From the Ohio State University Wexner Medical Center, Columbus, OH (Drs Schneider and Dixon); Ohio Colleges of Medicine Government Resource Center, Columbus, OH (Ms Lorenz, Dr Menegay, Mr Afflitto, and Ms Lamb); University Hospitals Cleveland Medical Center, Cleveland, OH (Dr Cossler and Ms Ford); The MetroHealth System, Cleveland, OH (Dr Gibson); Cincinnati Children's Hospital Medical Center, Cincinnati, OH (Dr Lannon and Ms Fuller); Ohio Perinatal Quality Collaborative, Cincinnati, OH (Dr Lannon and Mses Fuller and Ford); Ohio Department of Health, Columbus, OH (Dr Oza-Frank); Ohio Hospital Association, Columbus, OH (Mr Everett); Cleveland Clinic Foundation, Cleveland, OH (Dr Lappen).

Received Nov. 18, 2022; revised Jan. 22, 2023; accepted Feb. 24, 2023.

The authors report no conflict of interest.

This project is supported by the Health Resources and Services Administration (HRSA) of the US Department of Health and Human Services (HHS) as part of an award totaling $10,361,110 with 0% percentage financed with nongovernmental sources. The contents are those of the authors and do not necessarily represent the official views of or endorsement by the HRSA, HHS, or US government.

Corresponding author: Patrick Schneider, MD. patrick.schneider@osumc.edu